

THE UPSIDE-DOWN-WORLD OF E-LEARNING

Donna Gibbs

School of Education,
Macquarie University, NSW, AUSTRALIA
Donna.Gibbs@mq.edu.au

Maree Gosper

Institute of Higher Education Research and Development
Macquarie University, NSW, AUSTRALIA
Maree.Gosper@mq.edu.au

Abstract

New technologies rather than educational principles and philosophies have tended to dictate the shape of development in the world of e-learning. Giving educators an active and determining rather than a passive role in the development of learning systems is vital if e-learning is to realise its transformative potential in education in the 21st century. Many of the currently available learning technologies and systems, generally devised by technicians rather than educators, have offered limited room for creative or effective teaching. The limitations of these systems – their time consuming nature and their failure to adapt the technology to take account of educational contexts – need to be understood, acknowledged and overcome. The next generation of learning technologies and systems will only take us forward if educators have a much greater stake in controlling how they are developed. The article identifies some key theoretical and practical issues which should be given priority in newly emerging learning technologies and systems.

Keywords

E-Learning, Learning Management Systems, learning design, online pedagogies, educational theory.

The E World

E-learning - the use of digital technologies to support the processes of teaching and learning - is firmly established as having an important and ongoing role in the delivery of education and training (McLean, 2001; Sharpe & Benfield, 2005; Australian Flexible Learning Survey, 2005). Yet the ad hoc nature of the developments contributing to the building of this 'business', and the rapid, though piecemeal, way in which e-learning is pervading many developed countries has meant that issues fundamental to the success of this enterprise are being overlooked. Vital educational questions as to the nature and quality of learning that is enabled by these developments, or ways in which individual technologies can be organised and combined into learning systems designed to improve learning are, ironically, not the first things being considered as institutions position themselves to claim a dominant role in e-learning markets.

Educators have long been at the mercy of the constraints of learning technologies and systems. In many cases the authority of the educator has been displaced by the corporate organisations who develop the commercial products used by educators to teach their students. As de Castell, Bryson, & Jemsen (2001) explain, products for the 'education marketplace' are created by designers and developers 'with little or no experience of, or interest in, underlying educational goals'. Given this situation it is not surprising that online learning environments are being described as still emerging from the cottage industry phase of development (McLean & Lynch, 2004).

In short, technological and marketplace concerns are driving e-learning, while educators remain in a subordinate position, adapting to the structures they are presented with. These structures tend to invite and accommodate a narrow and restrictive view of education which leads to pedagogically weak designs for learning. This upside-down order must be righted: educators need to play a more active, determining role in the development of the next generation of learning technologies to ensure that a richer learning environment for all students is at the top of e-learning agendas.

Pedagogies and E-learning

E-learning has many different faces. It is useful to differentiate between e-learning which is primarily driven by delivery imperatives and e-learning for learning, although both are interrelated. From a delivery perspective e-learning can be thought of as a continuum ranging from using technology in a classroom with a teacher, to learning in a virtual classroom where there is no face-to-face contact between student and teacher, as in distance learning. Creating learning experiences for students along this continuum involves using technologies of various kinds and in various ways. The nature of the delivery is an important factor to the teacher when selecting appropriate pedagogies and teaching strategies. The teaching strategies required in a classroom where students are working with technology is different in kind from the monitoring and behind the scenes support required of a teacher when students are independently carrying out a task at a distance, over a period of time, on a discussion board or in a chat room.

From a learning perspective the methods and strategies employed to support learning will vary according to specific aims and outcomes (McKeague & Di Vesta, 1996). Disciplinary differences underpinned by different philosophical and epistemological foundations also influence pedagogical approaches and thus the nature and function of the e-learning technologies employed to support teaching and learning. As noted by Bates and Poole (2003)

..... the choice and use of technology are absolutely dependent on beliefs and assumptions we have about the nature of knowledge, how our subject discipline should be taught, and how students learn (p. 25).

While teaching strategies and methods may differ according to the philosophical underpinnings, the desired learning outcomes and the mode of delivery, a widely accepted approach to learning suggests several learning principles which could be considered common to most learning theories and teaching contexts: drawing on prior learning, building links between new knowledge and old, providing students with a variety of different kinds of learning experiences, and providing opportunities for engagement and interactivity (Boud & Prosser, 2002; El-Hindi, 1998; Murphy, 1997; Merrill, 2002).

Current learning management systems such as Blackboard and WebCT have been pivotal to the uptake of e-learning in the higher education sector in the past decade largely because of their capacity for online delivery. These, and other similar systems, when used creatively, are able to provide students with quite varied learning experiences, particularly in relation to the sequencing of content based, self-paced learning experiences. But more often than not, teaching within these systems can be like attempting to teach in a straitjacket. Oliver (quoted in Mann, 1999, p.16) found the 'pedagogical awkwardness' of commercial systems so inconvenient that he created his own simplified system using a single web page template. An evaluation of learning environments by five universities in north east England (Ingraham, et.al., 2002) concluded that a main drawback is the systems are not tailored to meet the specific needs of an institution and require costly and time consuming adaptation to make them suitable. The evaluation found that many learning systems are closely modelled on 'training and/or US pedagogies' which encourage a transmission approach rather than encouraging 'reflective discursive interaction'. Kuriloff (2001) also decries the way these systems insist on a uniform pedagogy and constrain innovation.

A key enabling feature of these technologies is the tools they provide for developing, organising and managing access to online content, but this strength tends to promote narrow pedagogies – the delivery of content-centric instruction via a transmission model of learning is a common practice.

They do not readily allow for the creation of learning environments and sequences that provide opportunities for multi-user collaborative activities or the co-construction of knowledge – both representative of current learning theory. The availability of learning objects and the recent emergence of social software in the form of group work tools, wikis and blogs provide a much needed addition to the armoury of technologies available to teachers offering more dynamic approaches to one-to-many (blogs) and many-to-many (wikis) modes of communication. However, in practice, because they can be technically challenging to incorporate into existing learning management systems they are more likely to cater for the delivery of independent one-off activities rather than being seamlessly incorporated into a comprehensive electronic learning sequence that builds towards the achievement of particular learning outcomes.

A greater focus on the learning, rather than delivery, aspects of e-learning is called for in the next generation of learning technologies and learning management systems. As educators work with developers it would be helpful if they were able to theorise the kinds of electronic learning systems they need to enable the provision of learning experiences for students that are comprehensive, cumulative and seamless and at the same time extend beyond the narrow transmissive models of learning to embrace interpretivist and critical models which value the learner as a co-contributor, not merely as an acquirer of knowledge (de Boer & Collis, 2002). This would go some of the way towards establishing an educational theory of technology which would 'seek to articulate particular machine capabilities with specific epistemic purposes' (de Castell et al., 2001). An attempt to suggest how such a theory might have application where learning principles loosely based on a constructivist epistemology are presented in relation to their implications for learning systems is provided in Table 1 below:

Learning principles based loosely on constructivist values	Implications for learning systems
Students learn by reflecting on their prior knowledge and experiences to construct new meanings. They have different learning needs, different ability levels, and different backgrounds (eg gender, ethnicity, language) that need to be considered.	Learning systems should: <ul style="list-style-type: none"> provide the flexibility to present pathways that are alternative to 'mainstream' activities for both individuals and groups to accommodate individual backgrounds and learning needs.
Students learn from being actively engaged, from doing, rather than from passive 'listening' and 'reading' without a defined purpose.	Learning systems should: <ul style="list-style-type: none"> provide access to materials and resources in the full range of multimedia formats. support a wide range of ways students can access and interact (at a serious level – not just clicking and moving around screens) with their learning environment. support levels of interactivity that enable the provision of a variety of feedback in terms of timing, content and media formats (audio, video, text). provide opportunities for multi-tasking in relation to inputs (e.g., accessing information and stimuli) and outputs (e.g., expression of ideas and dissemination of work).
Students learn from situations that are meaningful to their goals, aspirations, workplace and other contexts.	Learning systems should: <ul style="list-style-type: none"> enable access to authentic data, experiences, situations and personalities.
Students learn from their interactions with peers and teachers. They need to collaborate in different ways, engage in group activities, and be able to easily publish and	Learning systems should: <ul style="list-style-type: none"> support collaboration through group work where individuals take different roles (eg scribing, leading discussion, choosing activities etc).

display their work to each other, critiquing it where appropriate.	<ul style="list-style-type: none"> • support a full range of possible interactions – one-to-one, one-to-many, and many-to-many. • support synchronous and asynchronous interactions within and outside the classroom and at a distance. • enable ‘on-the-fly’ display and publication of the interactions taking place in the learning process and the outputs of these interactions.
Students should be guided towards becoming independent learners –working on their own and collaborating with peers.	Learning systems should: <ul style="list-style-type: none"> • scaffold the development of metacognitive skills by providing environments which offer varying levels of control over learning pathways and timing of activities by both students and teachers. • provide mechanisms for monitoring progress, troubleshooting and making adjustments to both content and process on-the-fly. • enable individual and group activities to be readily alternated.
Students should be given a voice so they become co-constructors of the learning environment	Learning systems should: <ul style="list-style-type: none"> • provide students with access to information and tools which enable them to define individual and group learning goals, access and manipulate content, develop and publish content, initiate and manage collaborations, initiate and manage communication, monitor and assess progress towards the defined goals.

Table 1: Learning Principles and their Implications for Learning Systems

Operational and Organisational Issues in E-learning

There are many contextual factors that characterise the different educational sectors and their cultures, and these are likely to determine teachers’ willingness to embrace e-learning. While the different sectors (higher education, TAFE, the schools, training institutions, etc) have many things in common, for example, competing priorities, funding constraints and time pressures, they also have highly individualised cultures. The cultural differences have implications for both the provision of content and the facilitation of learning processes in an e-learning environment. All the sectors have varying administrative requirements such as the kind of records that need to be kept, leading to variations in the electronic infrastructure required to administer and support an e-enterprise. As many researchers have pointed out, one size of learning system does not fit all (see, for example, Oliver et al., 2002; Kuriloff, 2001; Gruender, 1996).

Higher education tends to be driven by individuals with their ‘own’ ways of doing things independent of their larger organisational contexts. Academics are less likely to re-use resources and learning materials and more likely to create their own. TAFEs and training institutions tend to favour the packaging of whole courses in more customised ways; and schools tend to create a culture of sharing of best practice in the form of exchanging lesson materials and resources (Gosper, et.al., 2004). Teachers in schools and training institutions need to monitor each step of a student’s learning more closely than in other systems. Nevertheless, one commonality across all sectors is that if the development of new e-learning resources or the customisation of existing ones for integration into lessons is too time consuming (as it currently seems to be), and requires a fairly high level of technical expertise (as it currently does) then many teachers are likely to reject the use of e-learning in favour of traditional approaches (Gosper et.al., 2004) thus limiting the range of learning options for students.

Time Demands

Many of the expressed concerns come down to the time consuming nature of learning and teaching online using current systems. Dabbagh (2002) reports that 'one topic that students repeatedly address is time' and it is clear that students lose motivation when frustrated by the difficulties of these systems such as being repeatedly required to navigate in and out of different software using different passwords, difficulties with downloading material, and the awkwardness of using a system which is designed to accommodate a one-to-all mode (i.e. individuals interacting with a class as a whole) rather than more collaborative approaches where small groups interact independently, with each other, and with the whole class.

Staff also find online teaching continues to involve a much higher workload than face-to-face teaching. It has been estimated, for example, that online instruction requires approximately three times more preparation time than face-to-face instruction (Palloff and Pratt cited in Dabbagh, 2002). Pirani (2004) draws attention to the fact that instructors (and students) often underestimate the time commitment required for e-learning, and that the time involved in writing rather than speaking their thoughts, and dealing with what can be an overwhelming number of students' communications can be very demanding. White and Myers (2001 p.98) found the issue of highest concern to be instructors' time for adequate planning, but added that the time required 'to learn the program, convert and upload course data and provide student training' was also of concern. Even making small changes to a course of instruction can be excessively time consuming. Kraemar (2003, pp.87-8) reports that altering a quiz question, for example, can take as many as six steps, and in her library course, where the template on the design server had to be cloned multiple times, making a change after the cloning had been completed involved time out of all proportion to the smallness of the task. From the point of view of a designer, then, she found the complexities of making alterations in WebCT to be 'especially inefficient and frustrating'.

Foreman (2001) argues that teachers 'will not trade mules for tractors' until learning management systems are as easy to operate as the tools (paper and face-to-face classroom) of conventional pedagogy. He explains that WebCT 'demands far more effort than is required of a conventional instructor' and the excessive steps that need to be taken by both instructor and student, for things such as accessing grades or exchanging files, wastes valuable time that is not wasted in a conventional course. Until courses are able to be re-used, adapted and modified easily and quickly by instructors, and until there is a single sign-on with ease of interoperability between systems and products for students' easy navigation, the time consuming nature of e-learning will remain seriously limiting.

Technical Constraints

The range of tools employed in many of the currently available systems such as Blackboard and WebCT for displaying and managing content, communicating, providing feedback and monitoring students is fairly standard - usually encompassing content modules with predefined navigation, search and compile functions, email, discussion forums, chat, student homepages, quiz tools, tracking of student access, and a marking management system. The creative ways in which these tools can be combined and used, of course, determines what the teacher is able to do and the kind of learning experiences that can be provided for students individually and as group learners. But the systems themselves can be technologically 'clunky' and tend to promote information that is centralised and accessed in relatively static, non collaborative ways as has been indicated above.

While the use of these tools can allow for synchronous and asynchronous exchanges, too often the tools are placed as standalone elements in a course with little or no link to other learning activities – there is no concept of a coherent 'sequence of activities'. Determined teachers can approximate a sequence of activities in these systems with instructions about what to do next embedded in each tool, but this process is often awkward for teachers and learners, and does not provide a basis for easy re-use and adaptation of the sequence in different contexts. The lack of sequencing of multi-learner activities has been described by Dalziel as 'a significant blind spot in e-learning' (Dalziel, 2003), a blind spot which led him to develop the Learning Activity Management System (LAMS) to provide an environment where collaborative learning could flourish in a structured environment.

An early research trial of LAMS carried out by the Joint Information Systems Committee in the U.K. (Masterman, 2005) reports that teachers identified opportunities for collaborative learning as one of the benefits of LAMS.

On the whole, however, designers of learning systems have made little provision for creating sequences of learning activities that involve groups of e-learners interacting within a collaborative environment using both text and audio-visual options. This, of course has important pedagogical consequences by limiting what teachers can organise for students and how students engage in the learning process.

Standardisation and Interoperability

There are two crucial concerns for the designers of new systems - standardisation and interoperability or as Rosenberg (2001) explains it, the ability of e-learning systems and products to work seamlessly with each other. Both these comparatively recent agendas are fraught with difficulties as the many organisations involved grapple with the defining and interpreting of concepts, and struggle to come to terms with practical considerations, including establishing alliances between individual vendors whose interests are partly driven by the need for commercial returns.

Establishing standards involves creating a tagging system which allows relevant parts of a learning system, including the learning objects within it, to be standardised as it is built or developed. The use of a mark-up language such as XML (eXtensible Mark-up Language) allows for commonality in technical descriptions, and assists in their interpretation by machines. However, most standards to date have been based either implicitly or explicitly on a single learning, transmission model style of pedagogy (eg, SCORM). Standards which address multi-learner environments have only more recently come to the fore. The most promising of these is 'Learning Design' which describes learning as being organised around the principles of people, materials and activities - or to use Koper and Tattersall's (2005) explanation: 'people in specific groups and roles engage in activities using an environment with appropriate resources and services'.

When constructing new systems, analysing the needs of people requires an understanding of who the people are that need to be considered, and from what perspectives, and in what relationships. The establishment of design parameters for materials requires an understanding of the nature of the materials, how they will be used by teachers and students, and the issues that will enable their reuse in different contexts. The learning activities that teachers provide for their students will vary across sectors and in accord with different philosophical and epistemological perspectives. Nevertheless, learning principles as described in Table 1 are a sound basis for developing experiences and activities that are pedagogically neutral and thus inclusive of a range of perspectives. The implications for learning systems that have been identified above are just some of the design parameters for consideration in future technologies and systems.

The different ways these three elements of people, materials and activities are combined or co-ordinated create a work-flow pattern or learning sequence. The emergence of Learning Design as a model for software development is a crucial part of the process of certifying standards, as it provides, among other things, greater emphasis on the users (teachers and learners) and has the potential to implicitly or explicitly capture a range of pedagogical models.

While there has been considerable progress in the certification of standards, there is also ongoing debate as to the deficiencies and difficulties which accompany the process. There is a strong case 'for more concerted action between various standards-making bodies at the international level' (McLean, 2003). And Buzza et.al., (2005) argue that if the IMS Learning Design specification, for example, is to be used widely then users will need effective ways to contribute to, access and adapt the repositories where reusable learning designs and resources are collected and stored. Movements towards creating interoperability between designs, resources and learning systems have been gaining greater legitimacy as content vendors have begun to recognise the commercial advantages of an open rather than a closed architecture. Nevertheless, unless an educational voice

is actively incorporated into the process of standards design and certification, any advances in technologies and systems will continue to be in danger of failing to capture the complexities of the educational process. The upside-down world will continue to be perpetrated and technologies will continue to place educators in straitjackets.

Putting the Right-side Up

To right the upside-down world of e-learning, learning must be given the prominence it deserves when designing and developing learning technologies and systems. We need to find ways of developing e-learning technologies and systems to meet global standards, be interoperable with other systems, and yet encourage the pedagogical richness which reflects the full range of philosophical and epistemological perspectives. Fundamental to achieving this is a continuing dialogue between teachers and developers. Finding ways to enable educators and software designers to communicate more effectively depends on finding ways to change the prevailing cultures. Examples of successful interaction of this kind are few and the stumbling blocks which make such collaboration unlikely are all too evident.

A means of achieving more effective communication between the parties may partly lie in recognising the significance of increased, focused, and relevant professional development for educators about technology and its implications for learning (an area more often than not given minimal or inadequate attention or even neglected entirely). Professional development activities need to be supported by evidence-based research on the impact of learning technologies on students and their achievement of specified learning outcomes. Teachers also need to experience what technology can do for their students, and be given exposure to the latest software tools to explore ways of improving learning. The modelling of possibilities of this kind may then have an impact on changing the practices of those educators who have fallen into the trap of uninspired and poor uses of the systems that are available to them.

Similarly, software designers need professional development opportunities that provide exposure to the complexities of the educational context. They need to be conversant with the full range of pedagogical approaches ranging from those reflective of positivist through to interpretivist and critical perspectives. This understanding is essential for e-learning to be elevated from a mechanism for delivering education to that of facilitating learning. Raising the awareness of software designers to the value and importance of recognising and engaging with educators' frustrations and desires with the technologies they use will assist in developing constructive (rather than reactive) ways of establishing effective communication between the parties.

There is also an urgent need to grow a small community of specialists with a deep understanding of current technologies and educational paradigms relevant to different education sectors, disciplines, and teaching and learning contexts so that they can help bridge the gap between the technical and educational communities. These individuals can play the important role of 'translator' between the two communities, helping to express possibilities and problems in a language that each side can understand, so as to foster further dialogue. There is a need for greater recognition and targeted support for these individuals, and for senior policy makers to begin considering how to develop (non-precarious) career pathways for this crucial role.

Learning Design is an important step forward in the world of software design because of its potential to give the educational voice a higher priority. While there is still much to achieve in relation to establishing pedagogically flexible standards and interoperability principles, there is ready recognition that the achievement of these goals is likely to bring significant benefits to the educational world. But if Learning Design is to honour its claim of being able to refocus software design on learning, it is imperative that the three organising principles of people, materials and activities address the issues highlighted and give a real voice to the needs of teachers and learners.

Until educators take more responsibility for articulating their teaching and learning needs and software developers address these needs and broaden their understanding of the educational environment it seems unlikely that our upside-down-world will be righted. The danger is that the

transformative possibilities of technology may not be fully realised in anything more than isolated pockets of disparate educational communities. An equal danger is that market driven systems that do not have well thought out educational foundations and directions will continue to flourish in a Darwinian jungle of commercially driven 'educational' enterprise.

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